

Electronics Technologies Programs

electronics.chemeketa.edu

Career opportunities in the electronics field are diverse, exciting, and rewarding. Chemeketa's electronics department offers seven programs of study to meet the present and future challenges of the electronics industry: certificates in the areas of Process Control and Electronics, and associate degrees in Electronic Engineering Technician, Computer Electronics, Industrial Electronics, Process Control Technology, and Renewable Energy Management.

You may be interested in our Cooperative Work Experience program, which allows you to earn college credit for work you do related to your program. You will need department approval before you may enroll in ELT280A-H Cooperative Work Experience. For more information, look under Cooperative Work Experience in the catalog index or contact Roger White at 503.399.5068.

For additional information or tours of the electronics laboratory, visit electronics.chemeketa.edu.

Total required credit may vary due to three to four credit conversion. Chemeketa degree and certificate minimum requirements must be met.

Program outcomes:

Students completing the Electronics Certificate will:

- Apply professional and environmental safety practices associated with the workplace.
- Use standard terminology and clarifying language to communicate orally and in writing with customers, suppliers, supervisors, and co-workers.
- Use test equipment and perform basic test procedures.

Students completing the Process Control Certificate will:

- Apply skills in system performance and control processes to quickly adapt to new equipment processes and changes in manufacturing technology.
- Use standard process control terminology and clarifying language to communicate orally and in writing with customers, suppliers, supervisors, and co-workers.

Students completing the Electronic Engineering AAS will:

- Use communication, interpersonal, and leadership skills to establish and maintain collaborative relationships with supervisors, co-workers, and customers.
- Identify and solve technology problems related to electronic circuits and devices, mechanical systems, and computer hardware or software.
- Perform test procedures and use equipment to diagnose, maintain, and/or repair electronic/computer-based circuits and systems.

- Read and interpret written materials, including manuals, technical bulletins, schematics, and procedures to maintain and repair equipment or systems.
- Use standard terminology and clarifying language to communicate orally and in writing with customers, suppliers, supervisors, and co-workers.
- Practice skills and attitudes—individually and as a member of a team—that reflect quality management procedures and professional standards in the workplace.
- Apply professional and environmental safety practices associated with the workplace.

In addition to the Electronic Engineering outcomes, students completing the Computer Electronics AAS will:

- Identify and solve technology problems related to the manufacture, installation, or maintenance of computers or computer-like equipment.

In addition to the Electronic Engineering outcomes, students completing the Industrial Electronics AAS will:

- Identify and solve technology problems related to the development, manufacturing, installation, and servicing of computer integrated manufacturing systems, semiconductor and microelectronic manufacturing equipment, process control equipment, and robotic and other electromechanical systems.

In addition to the Electronic Engineering outcomes, students completing the Process Control Technology AAS will:

- Apply skills in system performance and control processes to quickly adapt to new equipment processes and changes in manufacturing technology.
- Identify and solve technology problems related to the development, manufacturing, installation, and servicing of process control systems including food processing, agriculture, pulp and paper, chemical, biofuel, and applications that require control.

In addition to the Electronic Engineering outcomes, students completing the Renewable Energy Management AAS will:

- Evaluate the energy use and recommend appropriate alternative energy solutions as well as energy conservation methods for various applications.

Getting started

The first step to entering the following programs is to take part in an assessment process, which includes taking the college's free placement test and meeting with Counseling and Career Services staff. You may need to complete pre-program courses. Then, your advisor will help you develop an individualized program of study, which may include one or more of the following:



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CA121	Keyboarding (if less than 25 wpm).....	3
CIS101	Introduction to Microcomputer Applications.....	3
MTH070	Elementary Algebra.....	4
RD090	College Textbook Reading.....	3
WR090	Fundamentals of Writing.....	4

If you have questions about the requirements, contact Counseling and Career Services at 503.399.5120. Failure to be assessed may delay your entry into program classes.

Electronic Engineering Technician

Electronics Certificate of Completion

The Electronics Pathway Certificate is a three-term program, which focuses on core electronics concepts, use of testing and monitoring equipment, a basic understanding of electronics-related materials, including blueprints, schematics, and work procedures, as well as industry recognized safety practices. The certificate is designed to provide graduates with the basic skills and knowledge of electronics. Courses are wholly contained in the Renewable Energy Management AAS.

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$1,490; class fees, \$215; equipment and supplies, \$3; and Intel-compatible computer, \$900. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn a Certificate of Completion by successfully completing the required 43 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
COM051	Communication Skills 1+	3
	or	
WR121	English Composition-Exposition+	4
ELT111	Electronics Orientation.....	1
ELT131	Electronic Concepts 1.....	4
MTH111	College Algebra+	5
	or	
MTH081	Technical Mathematics 1+.....	4
Term 2		
ELT132	Electronic Concepts 2.....	4
ELT141	Transistor Fundamentals.....	4
ELT151	Digital Fundamentals.....	4
MTH112	Trigonometry.....	5
	or	
MTH082	Technical Mathematics 2	4
Term 3		
COM053	Technical Report Writing	3
	or	
WR227	Technical Writing.....	4
ELT133	Electronic Concepts 3.....	4
ELT142	Semiconductor Optoelectronic Devices.....	3
ELT161	Linear IC Fundamentals.....	4
FE205B	Resumes and Job Search	1

+Meets related instruction requirement, see page 43. For subject areas, see page 55.

Electronic Engineering Technician

Process Control Certificate of Completion

The Process Control Certificate is a three-term program with focused concentration in the areas of electronics, systems design and safety, and instrumentation. It is for students seek-

ing to specialize in process control systems. This certificate is wholly contained in the Process Control Technology degree which prepares students to monitor and operate processing systems and instrumentation. Process control technology skills go across manufacturing industries. Students will gain skills in system performance and control processes which will allow them to more quickly adapt to new equipment processes and changes in manufacturing technology. The skill sets in this program are aligned with the International Society of Automation (ISA) standards.

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$1,590; class fees, \$245; equipment and supplies, \$925; and Intel-compatible computer, \$900. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn a Certificate of Completion by successfully completing the required 37 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
ELT121	Programming Concepts 1	4
MT101	Introduction to Process Control.....	2
MT211	Sensors and Control Elements 1.....	2
MT281	Process Control Practicum 1	2
Term 2		
MT212	Sensors and Control Elements 2.....	3
MT215	Instrumentation.....	3
MT227A	Pneumatics and Hydraulics Fundamentals.....	3
MT231	Programmable Logic Controllers 1.....	3
MT282	Process Control Practicum 2	2
Term 3		
ELT293	Flexible Manufacturing Systems and Processes.....	3
MT232	Programmable Logic Controllers 2.....	2
MT235	Human Machine Interfaces	2
MT241	System Calibration and Standards	2
MT283	Process Control Practicum 3	4

Electronic Engineering Technician

Computer Electronics Associate of Applied Science Option

Graduates of the Computer Electronics program begin careers with companies that manufacture, install, debug, or maintain computers or computer-like equipment. This equipment includes, but is not limited to, mainframe computers, mini and microcomputers, automated office equipment and systems (word processors, point-of-purchase terminals, local area and wide area networks), computer peripherals, engineering work stations, automated factory products, and data communication networks.

The training includes both specific technical skills needed in the field and broader skills in communications and human relations, which are necessary for career success. You'll have hands-on practice working with computer hardware and software. Classes emphasize both component and system-level troubleshooting as well as installation and maintenance of equipment and networks.

As a graduate of this program, you may also choose to transfer to a school such as Oregon Institute of Technology to complete the coursework required for a bachelor's degree. If you wish to transfer, declare your intent before the first term

and work closely with electronics advisor Charles Sekafetz (503.399.6254), and the institution to which you plan to transfer.

Students entering this program must have an Intel-compatible computer (Pentium 4 or better) and be computer literate (type approximately 20 wpm, and be familiar with the Windows operating system and word processing and spreadsheet software).

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$2,650; class fees, \$430; universal fee, \$840; equipment and supplies, \$410; and Intel-compatible computer, \$900. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn an Associate of Applied Science degree by successfully completing the required 102 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
ELT111	Electronics Orientation.....	1
ELT131	Electronic Concepts 1.....	4
MTH111	College Algebra+ (or higher).....	5
	or	
MTH081	Technical Mathematics 1+.....	4
NET123	Computer Operating Systems.....	4
WR121	English Composition–Exposition+.....	4
Term 2		
ELT132	Electronic Concepts 2.....	4
ELT141	Transistor Fundamentals.....	4
ELT151	Digital Fundamentals.....	4
MTH112	Trigonometry (or higher).....	5
	or	
MTH082	Technical Mathematics 2.....	4
Term 3		
ELT133	Electronic Concepts 3.....	4
ELT142	Semiconductor Optoelectronic Devices.....	3
ELT143	Pulse Circuit Fundamentals.....	3
WR227	Technical Writing.....	4
	Electronics electives*.....	4
Term 4		
ELT121	Programming Concepts 1.....	4
ELT252	Digital Circuit Applications.....	3
PH121	Applied Physics.....	4
SP111	Fundamentals of Public Speaking.....	4
	Electronics electives*.....	4
Term 5		
ELT253	Microprocessor Systems.....	4
ELT254	Computer Hardware.....	4
	or	
CIS145	Microcomputer Hardware.....	4
PSY104	Psychology in the Workplace+.....	4
	Electronics elective*.....	4

Term 6		
ELT222	Programming Concepts 2.....	4
	or	
CIS140U	UNIX/Linux.....	3
	or	
CIS179	Introduction to Client-Server Networks.....	4
FE205B	Resumes and Job Search Correspondence.....	1
ELT256	Advanced Computer Architecture.....	4
ELT283	Logical Troubleshooting.....	4
	Electronics elective*.....	4

*Computer Electronics electives :

Term 3		
ELT161	Linear IC Fundamentals.....	4
	or	
NET141	Networks for Small Business.....	4
Term 4		
ELT244	Electronic Circuit Analysis.....	4
	or	
NET142	Medium Business Networks.....	4
Term 5		
CIS278	Data Communications.....	4
	or	
NET143	Routing and Switching Systems.....	4
Term 6		
ELT255	Advanced Data Communications.....	4
	or	
CIS279	Network Management.....	5
	or	
NET144	Network Design and Support.....	4

+Meets related instruction requirement, see page 43. For subject areas, see page 55.

Electronic Engineering Technician Associate of Applied Science

Upon graduation from the Electronic Engineering Technician program, you may begin a career assisting in the design, manufacturing, installation, and service of microelectronics and semiconductor manufacturing systems, telecommunication equipment and systems, electronic test instruments, medical measuring and monitoring equipment, computers, video systems, automation products, security and safety systems, process control systems, and flexible automation systems (robots). Training includes specific technical skills needed in the field and broader skills in communications, teamwork, and human relations, which are necessary for career success.

As a graduate of this program, you may choose to transfer to a school such as Oregon Institute of Technology to complete the coursework required for a bachelor's degree. If you wish to transfer, declare your intent before the first term and work closely with the electronic engineering advisor (Charles Sekafetz, 503.399.6254) and the institution to which you plan to transfer.

Students entering this program must have an Intel-compatible computer (Pentium 4 or better) and be computer literate (type approximately 20 wpm, and be familiar with the Windows operating system and word processing and spreadsheet software).

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$2,820; class fees, \$430; universal fee, \$816; Intel-compatible computer, \$900; equipment and supplies, \$410. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn an Associate of Applied Science degree by successfully completing the required 103 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
DRF101	Basic CAD for Electronics.....	2
ELT111	Electronics Orientation.....	1
ELT131	Electronic Concepts 1.....	4
MTH111	College Algebra+ (or higher).....	5
	or	
MTH081	Technical Mathematics 1+.....	4
WR121	English Composition–Exposition+.....	4
Term 2		
ELT132	Electronic Concepts 2.....	4
ELT141	Transistor Fundamentals.....	4
ELT151	Digital Fundamentals.....	4
MTH112	Trigonometry (or higher).....	5
	or	
MTH082	Technical Mathematics 2.....	4
Term 3		
ELT133	Electronic Concepts 3.....	4
ELT142	Semiconductor Optoelectronic Devices.....	3
ELT143	Pulse Circuit Fundamentals.....	3
ELT161	Linear IC Fundamentals.....	4
WR227	Technical Writing.....	4
Term 4		
ELT121	Programming Concepts 1.....	4
ELT244	Electronic Circuit Analysis.....	4
ELT252	Digital Circuit Applications.....	3
PH121	Applied Physics.....	4
	or	
PH201	General Physics.....	4
SP111	Fundamentals of Public Speaking.....	4
Term 5		
ELT253	Microprocessor Systems.....	4
ELT262	Linear IC Applications.....	3
ELT281	Antennas and Transmission Lines.....	2
ELT282	Telecommunications.....	3
PH122	Applied Physics.....	4
	or	
PH202	General Physics.....	4
FE205B	Resumes and Job Search Correspondence.....	1
Term 6		
ELT283	Logical Troubleshooting.....	4
ELT291	Control, Robotics and Power Systems.....	4
PSY104	Psychology in the Workplace+.....	4
	Electronics electives*.....	6

+Meets related instruction requirement, see page 43. For subject areas, see page 55.

***Electronics electives (select 6 credits):**

(For second-year students only; must have prior approval of program chair.)

CH121	College Chemistry.....	5
CH201	Chemistry for Engineers.....	4
CIS145	Microcomputer Hardware.....	4
ELT222	Programming Concepts 2.....	4
ELT254	Computer Hardware.....	4
ELT255	Advanced Data Communications.....	4
ELT256	Advanced Computer Architecture.....	4
ELT280C	Cooperative Work Experience*.....	3
ELT293	Flexible Manufacturing Systems and Processes.....	3
MT101	Introduction to Process Control.....	2
MT110	Microelectronics and Solar Cell Manufacturing.....	3
MT211	Sensor and Control Elements 1.....	2
MT212	Sensor and Control Elements 2.....	3
MT215	Instrumentation.....	3
MT221	Fluid and Vacuum Systems.....	4
MT223	High Vacuum Technology.....	3
MT227A	Pneumatics and Hydraulics Fundamentals.....	3
MT231	Programmable Logic Controllers 1.....	3
MT232	Programmable Logic Controllers 2.....	2
MT235	Human Machine Interfaces.....	2
MT241	System Calibration and Standards.....	2
MT281	Process Control Practicum 1.....	2
MT282	Process Control Practicum 2.....	2
MT283	Process Control Practicum 3.....	4
MTH241	Elementary Calculus.....	4
MTH243	Probability and Statistics 1.....	4
MTH251	Differential Calculus (or higher).....	5
PH203	General Physics.....	4
RNW110	Solar Energy Systems.....	3
RNW120	Wind Energy Systems.....	3
RNW130	Biomass Energy Systems.....	3
RNW140	Hydroelectric and Geothermal Energy Systems.....	3
RNW180	Energy Management.....	3

Electronic Engineering Technician

Industrial Electronics Associate of Applied Science Option

Students selecting the Industrial Electronics program may begin careers—upon graduation—assisting in the development, manufacturing, installation, and servicing of computer-integrated manufacturing systems, semiconductor, and microelectronic manufacturing equipment, process control equipment, and robotic, and other electromechanical systems. This program stresses mechanical, computer, and electronic theory, as well as the communication and human relation skills needed for career advancement.

As a graduate of this program, you may choose to transfer to a school such as Oregon Institute of Technology to complete the coursework required for a bachelor's degree. If you intend to transfer, declare your intent before the first term and work closely with the Industrial Electronics advisor (Charles Sekafetz at 503.399.6254) and the institution to which you plan to transfer.

Students entering this program must have an Intel-compatible computer (Pentium 4 or better) and be computer literate (type approximately 20 wpm, and be familiar with the Windows operating system and word processing and spreadsheet software).

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$2,625; class fees, \$430; universal fee, \$808; Intel-compatible computer, \$900; equipment and supplies, \$455. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn an Associate of Applied Science degree by successfully completing the required 103 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
DRF101	Basic CAD for Electronics.....	2
ELT111	Electronics Orientation.....	1
ELT131	Electronic Concepts 1.....	4
MT110	Microelectronics and Solar Cell Manufacturing.....	3
MTH081	Technical Mathematics 1+.....	4
	or	
MTH111	College Algebra+ (or higher).....	5
WR121	English Composition–Exposition+.....	4
Term 2		
ELT132	Electronic Concepts 2.....	4
ELT141	Transistor Fundamentals.....	4
ELT151	Digital Fundamentals.....	4
MTH082	Technical Mathematics 2.....	4
	or	
MTH112	Trigonometry (or higher).....	5
Term 3		
ELT133	Electronic Concepts 3.....	4
ELT142	Semiconductor Optoelectronic Devices.....	3
ELT143	Pulse Circuit Fundamentals.....	3
ELT161	Linear IC Fundamentals.....	4
WR227	Technical Writing.....	4
Term 4		
ELT121	Programming Concepts 1.....	4
	or	
CIS133J	Fundamentals of Java Programming 1.....	4
ELT244	Electronic Circuit Analysis.....	4
ELT252	Digital Circuit Applications.....	3
PH121	Applied Physics.....	4
	or	
PH201	General Physics.....	4
SP111	Fundamentals of Public Speaking.....	4
Term 5		
ELT253	Microprocessor Systems.....	4
ELT262	Linear IC Applications.....	3
FE205B	Resumes and Job Search Correspondence.....	1
PH122	Applied Physics.....	4
	or	
PH202	General Physics.....	4
	Technical elective*.....	3
Term 6		
ELT291	Control, Robotics and Power Systems.....	4
PSY104	Psychology in the Workplace+.....	4
	Technical electives*.....	9

+Meets related instruction requirement, see page 43. For subject areas, see page 55.

***Technical electives:**

CH121	College Chemistry.....	5
CH201	Chemistry for Engineers.....	4
CIS145	Microcomputer Hardware.....	4
DRF251	Power Transmission Design.....	3
ELT254	Computer Hardware.....	4
ELT283	Logical Troubleshooting.....	4
ELT293	Flexible Manufacturing Systems and Procedures.....	3
MT221	Fluid and Vacuum Systems.....	4
MT223	High Vacuum Technology.....	3
MT227A	Pneumatics and Hydraulics Fundamentals.....	3
MTH243	Probability and Statistics 1.....	4

Electronic Engineering Technician

Process Control Technology Associate of Applied Science Option

Students in this program will gain skills in system performance and control processes which will allow them to more quickly adapt to new equipment and procedures in the manufacturing industry. Process control technology skills cross all segments of the manufacturing industry. Graduates of this program may find work with solar, silicon, biofuel, and food processing companies, or a variety of other manufacturing entities.

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$2850; class fees, \$400; equipment and supplies, \$465; and Intel-compatible computer, \$900. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn an Associate of Applied Science degree by successfully completing the required 92 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
ELT111	Electronics Orientation.....	1
ELT131	Electronic Concepts 1.....	4
MT101	Introduction to Process Control.....	2
MTH111	College Algebra+ (or higher).....	5
	or	
MTH081	Technical Mathematics+.....	4
WR121	English Composition - Exposition+.....	4
	or	
COM051	Communication Skills 1+.....	3
Term 2		
ELT132	Electronic Concepts 2.....	4
ELT141	Transistor Fundamentals.....	4
ELT151	Digital Fundamentals.....	4
MTH112	Trigonometry (or higher).....	5
	or	
MTH082	Technical Mathematics 2.....	4
Term 3		
ELT133	Electronic Concepts 3.....	4
ELT142	Semiconductor Optoelectronic Devices.....	3
ELT161	Linear IC Fundamentals.....	4
FE205B	Resumes and Job Search Correspondence.....	1
WR227	Technical Writing.....	4
	or	
COM053	Technical Report Writing.....	3

Term 4	
ELT121	Programming Concepts 1 4
MT211	Sensors and Control Elements 1..... 2
MT281	Process Control Practicum 1 2
PH121	Applied Physics 4
	or
PH201	General Physics 4
SP111	Fundamentals of Public Speaking 4

Term 5	
MT212	Sensors and Control Elements 2..... 3
MT215	Instrumentation 3
MT227A	Pneumatics and Hydraulics Fundamentals 3
MT231	Programmable Logic Controllers 1..... 3
MT282	Process Control Practicum 2 2

Term 6	
ELT293	Flexible Manufacturing Systems and Processes..... 3
MT232	Programmable Logic Controllers 2..... 2
MT235	Human Machine Interfaces 2
MT241	System Calibration and Standards 2
MT283	Process Control Practicum 3 4
PSY104	Psychology in the Workplace+ 4

+Meets related instruction requirement, see page 43. For subject areas, see page 55.

Electronic Engineering Technician

Renewable Energy Management Associate of Applied Science Option

The Renewable Energy Management program coursework prepares students for employment designing, installing, and managing renewable energy systems. They may find work with national and international installation contractors in the areas of marketing and sales, materials estimating, and sizing and design. Students of this program will follow the first-year curriculum of the Electronics Engineering Technician program.

During the second year, students in the Renewable Energy Management program will take coursework covering solar, wind, biomass, hydroelectric, and geothermal energy systems. A course in energy management systems will provide a capstone experience for students in the program.

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$2,650; class fees, \$355; equipment and supplies, \$625; and Intel-compatible computer, \$900. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn an Associate of Applied Science degree by successfully completing the required 94 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
Term 1		
COM051	Communication Skills 1+ 3	
	or	
WR121	English Composition-Exposition+ 4	
ELT111	Electronics Orientation 1	
ELT131	Electronic Concepts 1..... 4	
MT110	Microelectronics and Solar Cell Manufacturing 3	
MTH111	College Algebra+ (or higher)..... 5	
	or	
MTH081	Technical Mathematics 1+ 4	
Term 2		
ELT132	Electronic Concepts 2..... 4	
ELT141	Transistor Fundamentals..... 4	
ELT151	Digital Fundamentals..... 4	
MTH112	Trigonometry (or higher)..... 5	
	or	
MTH082	Technical Mathematics 2 4	
Term 3		
COM053	Technical Report Writing 3	
	or	
WR227	Technical Writing..... 4	
ELT133	Electronic Concepts 3..... 4	
ELT142	Semiconductor Optoelectronic Devices 3	
ELT161	Linear IC Fundamentals..... 4	
Term 4		
ELT121	Programming Concepts 1 4	
ELT252	Digital Circuit Applications 3	
PH121	Applied Physics 4	
	or	
PH201	General Physics 4	
RNW110	Solar Energy Systems..... 3	
SP111	Fundamentals of Public Speaking 4	
Term 5		
FE205B	Resumes and Job Search Correspondence..... 1	
MT227A	Pneumatics and Hydraulics Fundamentals 3	
PH122	Applied Physics 4	
	or	
PH202	General Physics 4	
RNW120	Wind Energy Systems 3	
RNW130	Biomass Energy Systems 3	
Term 6		
ELT291	Control, Robotics, Power Systems 4	
ELT293	Flexible Manufacturing Systems 3	
PSY104	Psychology in the Workplace+ 4	
RNW140	Hydroelectric and Geothermal Energy Systems..... 3	
RNW180	Energy Management 3	